

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/637,108	08/08/2003	Gurtej S. Sandhu	3264.6US (92-0280.09/US)	5025
24247	7590	02/27/2004	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			LEBENTRITT, MICHAEL	
			ART UNIT	PAPER NUMBER
			2824	

DATE MAILED: 02/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/637,108	SANDHU ET AL.	
	Examiner	Art Unit	
	Michael S. Lebentritt	2824	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on ____.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-20 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
 5) Claim(s) ____ is/are allowed.
 6) Claim(s) 1-20 is/are rejected.
 7) Claim(s) ____ is/are objected to.
 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 17 December 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. ____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 12172003.

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. ____ .
 5) Notice of Informal Patent Application (PTO-152)
 6) Other: EBBT SEARCH

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 12/17/03 was filed before the mailing date of the first action on the merits. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the examiner is considering the information disclosure statement.

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 1-20 are rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-10 of prior U.S. Patent No. 6,632,736. This is a double patenting rejection.

The claims are identical:

providing a silicon region on a surface of a semiconductor wafer for making electrical contact thereto; depositing a dielectric layer over at least a portion of the silicon region; etching a contact opening through the dielectric layer for exposing a portion of the silicon region, the contact opening having a side wall; depositing a titanium metal layer within the contact opening for covering the portion of the silicon region exposed by the contact opening; depositing a predominantly amorphous titanium carbonitride film having (predominantly no definite

Art Unit: 2824

crystalline structure and) having (substantially) predominantly no crystalline titanium therein, the predominantly (substantially) amorphous titanium carbonitride film for lining the side wall of the contact opening to overlay the titanium metal layer covering the portion of the silicon region exposed by the contact opening; and filling at least a portion of the contact opening using a conductive material.

2. The process of claim 1, wherein depositing the predominantly amorphous titanium carbonitride film comprises a chemical vapor deposition process.

3. The process of claim 2, wherein the chemical vapor deposition process includes: evacuating a deposition chamber to a pressure of less than about 100 torr; heating the semiconductor wafer to a temperature within a range of about 200.degree. C. to about 600.degree. C.; maintaining the temperature of the semiconductor wafer within the range of about 200.degree. C. to about 600.degree. C.; admitting an organometallic precursor compound into the deposition chamber, the organometallic precursor compound including a tetrakis-dialkylamido-titanium compound; decomposing the organometallic precursor compound at least near the surface of the semiconductor wafer; and depositing the predominantly amorphous titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium therein on at least a portion of the surface of the semiconductor wafer and within at least a portion of the contact opening.

4. The process of claim 3, wherein the organometallic precursor compound comprises tetrakis-dimethylamido-titanium.

5. The process of claim 1, wherein the conductive material comprises a metal selected from the group consisting of tungsten, aluminum, copper and nickel.

6. The process of claim 1, wherein the conductive material comprises doped polycrystalline silicon.

7. The process of claim 1, further comprising: heating the semiconductor wafer; and reacting at least a portion of the titanium metal layer covering the portion of the silicon region exposed by the contact opening with the silicon region to form a titanium silicide layer.

8. The process of claim 7, wherein the reacting the at least a portion of the titanium metal layer with the silicon region

Art Unit: 2824

occurs prior to depositing the predominantly amorphous titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium nitride therein.

9. The process of claim 7, wherein the reacting the at least a portion of the titanium metal layer with the silicon region occurs subsequent to depositing the predominantly amorphous titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium nitride therein.

10. The process of claim 1, further comprising: subjecting the predominantly amorphous titanium carbonitride film having predominantly no definite crystalline structure and having predominantly no crystalline titanium therein to rapid thermal processing in the presence of one or more gases selected from the group consisting of nitrogen, hydrogen and the noble gases.

Conclusion

The following are suggested formats for either a Certificate of Mailing or Certificate of Transmission under 37 CFR 1.8(a). The certification may be included with all correspondence concerning this application or proceeding to establish a date of mailing or transmission under 37 CFR 1.8(a). Proper use of this procedure will result in such communication being considered as timely if the established date is within the required period for reply. The Certificate should be signed by the individual actually depositing or transmitting the correspondence or by an individual who, upon information and belief, expects the correspondence to be mailed or transmitted in the normal course of business by another no later than the date indicated.

Please refer to 37 CFR 1.6(d) and 1.8(a)(2) for filing limitations concerning facsimile transmissions and mailing, respectively.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael S. Lebentritt whose telephone number is 571-272-1873. The examiner can normally be reached on 5/4/9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on 571-272-1869. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael S. Lebentritt
Primary Examiner
Art Unit 2824
